REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated October 31, 2006. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1, 3-8, 10-16, and 18-32 are under consideration in this application. Claims 1 and 21 are being amended, as set forth above, in order to more particularly define and distinctly claim Applicants' invention.

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejections

Claims 1, 3, 8, 10-16, 18, 20-22 and 28-31 were rejected under 35 U.S.C. § 102(e) as being anticipated by a new reference U.S. Patent No. 6,544,834 Sugawara et al. (hereinafter "Sugawara"), and claims 4-7, 19, 23-27 and 32 were rejected under 35 U.S.C. § 103(a) as being unpatenable over Sugawara. These rejections have been carefully considered, but are most respectfully traversed.

The fabricating method of a semiconductor integrated circuit device having a capacitor with high-k material of the present invention, comprises the steps of: (a) forming a bottom electrode (p. 19, line 7) of said capacitor over a semiconductor substrate by a chemical vapor deposition method in a sub-atmospheric pressure using an organoruthenium compound as a precursor; (b) forming a dielectric film of said capacitor on said bottom electrode; and (c) forming a top electrode of said capacitor on said dielectric film. The bottom electrode essentially consists of ruthenium ("a *bottom electrode of ruthenium i.e., the deposition period*" p. 19, line 7; "*the reaction of the gases and the oxygen for Ru disposition*" p. 20, lines 5-6).

As recited in claim 1, the bottom electrode forming step (a) includes sub-steps of:(a-l) providing the semiconductor substrate in a deposition chamber; (a-2) after the step (a-1),

increasing a temperature of the semiconductor substrate in the chamber up to a desired temperature without supplying any oxidation gas to the deposition chamber; (a-3) after the step (a-2), separately supplying the precursor and an oxidation gas into the deposition chamber to form a ruthenium film for the bottom electrode with a desired thickness on the heated semiconductor substrate, said oxidation gas being separately supplied to said deposition chamber by a supplying system different from a precursor supplying system and only during when the precursor being supplied ("*The forgoing process is characterized in that the supply of an oxygen gas is limited to when the precursor is supplying during formation of a bottom electrode of ruthenium*" p. 21, lines 18-20); (a-4) after the step (a-3), stopping the supply of the precursor and said oxidation gas; and (a-5) after the step (a-4), decreasing the temperature of the semiconductor substrate without supplying the oxidation gas to the deposition chamber.

As recited in claim 21, the top electrode forming step (c) includes sub-steps of: (c-l) providing the semiconductor substrate in a deposition chamber; (c-2) after the step (c-1), increasing a temperature of the semiconductor substrate in the chamber up to a desired temperature with supplying an oxidation gas to the deposition chamber; (c-3) after the step (c-2), separately supplying the precursor and said oxidation gas into the deposition chamber to form a ruthenium film for the top electrode with a desired thickness on the heated semiconductor substrate, said oxidation gas being separately supplied to said deposition chamber by a supplying system different from a precursor supplying system; (c-4) after the step (c-3), stopping the supply of the precursor and said oxidation gas; and (c-5) after the step (c-4), decreasing the temperature of the semiconductor substrate with supplying an oxidation gas to the deposition chamber. The oxidation gas is supplied to said deposition chamber when the substrate temperature is increased, when the precursor is supplied, and when the substrate temperature is decreased.

In particular, features of claim 1 include that (1) increasing the temperature of the semiconductor substrate without supplying any oxidation gas to the deposition chamber before forming the ***bottom electrode*** of ruthenium by a CVD method, and (2) decreasing the temperature of the semiconductor substrate without supplying any oxidation gas to the deposition chamber after forming the bottom electrode of ruthenium by a CVD method. The underlined features allow forming a bottom electrode of ruthenium with a lesser amount of oxygen contamination than the detection limit of a TDS method such that it will not oxidize a barrier film (p. 19, lines 21-23).

Features of claim 21 include (3) increasing the temperature of the semiconductor substrate with supplying an oxidation gas to the deposition chamber before forming the ***top electrode*** of ruthenium by a CVD method, and (4) decreasing the temperature of the semiconductor substrate with supplying an oxidation gas to the deposition chamber after forming the top electrode of the ruthenium film by a CVD method. The underlined features allow forming a top electrode of ruthenium by inhibiting an increase in the leakage current due to the reduction of a high-k dielectric film of a capacitor (p. 22, lines 18-21).

Applicants respectfully contend that Sugawara fails to teach or suggest the features of Claim 1 of supplying an oxidation gas separately from the supply of the precursor into a deposition chamber and **only during** the precursor-supplying step for forming a bottom electrode (p. 22, line 15) essentially consisting of ruthenium of a capacitor; or Claim 21 of supplying an oxidation gas separately from the supply of the precursor into the deposition chamber and also **during** the substrate temperature increasing and decreasing steps and the precursor-supplying step for forming a top electrode essentially consisting of ruthenium of a capacitor.

Sugawara describes forming a ruthenium film by a CVD method in col. 16, lines 32-45 and col. 17, lines 6-18. However, the relevant descriptions do not involve the sequences of steps of supplying oxidation gas as recited in claims 1 and 21 of the present invention.

As to other portions in Sugawara cited by Examiner, they are irrelevant to forming a ruthenium film by a CVD method. In the outstanding Office Action, the Examiner simply mis-matched the oxidation gas supplying steps of forming other films (e.g., a SOG film or photoresist film) with forming a ruthenium film/electrode of the present invention; or mis-matched the oxidation gas supplying steps of forming a ruthenium film by sputtering (col. 16, lines 46-67) with forming a ruthenium film/electrode by a CVD method of the present invention.

Col.	Line	Content
12	15-21	Forming a SOG film by spin-coating
16	46-61	Forming a ruthenium film by sputtering
17	24-34	Forming a photoresist film and etching

Applicants contend that neither cited prior art reference, nor their combination teaches

or suggests each and every feature of the present invention as disclosed in independent claims 1 and 21. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

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